Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Flipping over: inversion characteristics of a buoyant cylindrical puck during oblique water impact ZACHARY SMITH, TADD TRUSCOTT, Brigham Young University — The Apollo Command Module had a tendency to flip over upon impact with the ocean surface after returning from space (9/19 times). In an effort to improve upon this idea for potential missions to Saturn's moon Titan, we present experimental results of a simplified buoyant cylindrical puck impacting the water surface. We examine the dependence of inversion upon vertical and horizontal velocity, center of gravity, and the pitch angle of the puck relative to the free surface. An analytical model is developed which characterizes inversion. High-speed images reveal that the puck does not completely submerge upon impact. Instead, the top of the puck remains above the water surface via a contact line attachment to the cavity. The asymmetric cavity then collapses, applying a moment, which can be sufficient to invert the puck after impact.

Tadd Truscott
Brigham Young University

Date submitted: 31 Jul 2014 Electronic form version 1.4